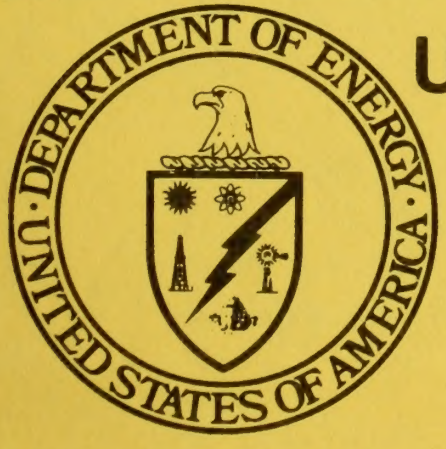
SOLAR/1069-79/04

Monthly Performance Report

LANDURA CORPORATION

APRIL 1979



U.S. Department of Energy

National Solar Heating and Cooling Demonstration Program

National Solar Data Program

MONTHLY PERFORMANCE REPORT

LANDURA CORPORATION

APRIL 1979

I. SYSTEM DESCRIPTION

The Landura Corporation site is a single-family residence in Stayton, Oregon. The house has approximately 1500 square feet of conditioned space. Solar energy is used for space heating the home and preheating domestic hot water (DHW). The solar energy system has an array of flat-plate collectors with a gross area of 318 square feet. However, the roof beneath the collector array is designed as a reflector surface and increases the effective collector area to 1072 square feet. The collector array faces south at an angle of 90 degrees to the horizontal. Water is the transfer medium that delivers solar energy from the collector array to storage and to the space heating and hot water loads. Solar energy is stored aboveground in two 1250-gallon tanks. Supply water is preheated in a heat exchanger coil in storage tank 1 and supplied, on demand, to a conventional 65-gallon DHW tank. When solar energy is insufficient to satisfy the space heating load, a heat exchanger/heat pump and an electrical heating element in the air-handling unit provide auxiliary energy. Similarly, an electrical heating element in the DHW tank provides auxiliary energy for water heating. The system, shown schematically in Figure 1, has four modes of solar operation.

Mode 1 - Collector-to-Storage: This mode is activated when temperature sensors in the collector array obtain a temperature differential 9°F higher than the average temperature in the storage tank. The collector loop pump then turns on and circulates water through the collector array and the storage tanks.

Mode 2 - Storage-to-Space Heating - Solar Only: This mode activates when there is a demand for heating and the temperature in the storage tank is higher than 90°F. Hot water is circulated through the hydronic coil in the air supply duct.

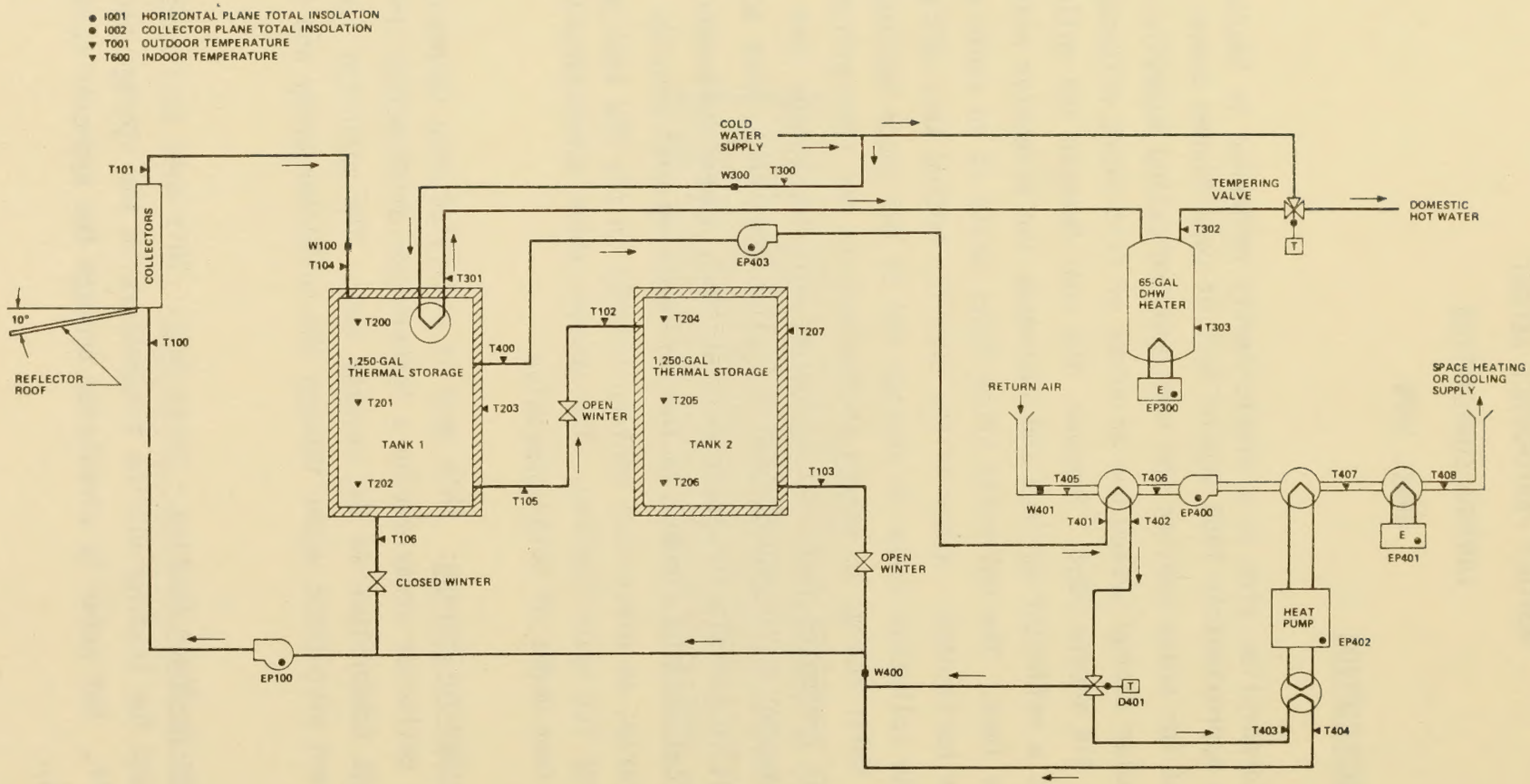


Figure 1. LANDURA CORP. SOLAR ENERGY SYSTEM SCHEMATIC

Mode 3 - Storage-to-Space Heating - Solar Plus Heat Pump: This mode activates when there is a demand for space heating and the temperature in the storage tank is higher than 50°F but lower than 90°F. Control valve D401 opens, allowing the hot water to circulate through the heat exchanger and assist the heat pump operation before returning to storage.

Mode 4 - Storage-to-DHW Tank: This mode activates when there is a demand for hot water as measured by flow through W300. Supply water is preheated by passing through the heat exchanger coil in storage tank 1 and then flows to the conventional DHW tank where auxiliary energy will heat it to the demand temperature.

II. PERFORMANCE EVALUATION

INTRODUCTION

The site was unoccupied in April and the solar energy system operated for 22 days during the month. Solar energy satisfied 72 percent of the space heating requirements. The solar energy system incurred an electrical energy expense of 0.10 million Btu.

WEATHER CONDITIONS

During the month, total incident solar energy on the collector array was 18.3 million Btu for a daily average of 569 Btu per square foot. This was below the estimated average daily solar radiation for this geographical area during April of 899 Btu per square foot for a south-facing plane with a tilt of 90 degrees to the horizontal. The average ambient temperature during April was 50°F and was equal to the long-term average for April. The number of heating degree-days for the month (based on a 65°F reference) was 465, as compared with the long-term average of 456.

THERMAL PERFORMANCE

Collector - The total incident solar radiation on the collector array for the month of April was 18.3 million Btu. During the period the collector loop was operating, the total insolation amounted to 7.9 million Btu. The total collected solar energy for the month of April was 2.0 million Btu, resulting in a collector array efficiency of 11 percent, based on total incident insolation. Solar energy delivered from the collector array to storage was 1.3 million Btu. Energy loss during transfer from the collector array to storage was 0.74 million Btu. This loss represented 36 percent of the energy collected. Operating energy required by the collector loop was 0.16 million Btu.

Storage - Solar energy delivered to storage was 1.3 million Btu. There were 0.42 million Btu delivered from storage to the DHW and space heating subsystems. Energy loss from storage was 0.30 million Btu. This loss represented 23 percent of the energy delivered to storage. The storage efficiency was 77 percent: This is calculated as the ratio of the sum of the energy removed from storage and the change in stored energy, to the energy delivered to storage. The average storage temperature for the month was 78°F.

DHW Load - The DHW subsystem consumed 0.31 million Btu of auxiliary electrical energy. The house was unoccupied and there was no hot water usage during the month. Therefore, the hot water load, hot water solar energy, and hot water solar fraction were all zero for the month.

Space Heating Load - The space heating subsystem consumed 0.43 million Btu of solar energy and 0.19 million Btu of auxiliary electrical energy to satisfy a space heating load of 0.60 million Btu. The solar fraction of this load was 72 percent. The space heating subsystem consumed a total of 0.080 million Btu of operating energy, resulting in an electrical energy savings of 0.059 million Btu.

OBSERVATIONS

The reflective surface is required on the roof if the collector array is to operate at design efficiency.

ENERGY SAVINGS

The solar energy system provided a net electrical energy expense of 0.10 million Btu. The DHW subsystem was not used and therefore contributed no energy savings or expense. The space heating subsystem provided an electrical energy savings of 0.059 million Btu.

III. ACTION STATUS

The grantee will investigate the control problems with valve D401 in the near future.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
SITE SUMMARY

SITE: LANDURA CORPORATION , STAYTON , OREGON SOLAR/1024-79/04
REPORT PERIOD: APRIL,1979

SITE/SYSTEM DESCRIPTION:
THE LANDURA CORPORATION SOLAR ENERGY SYSTEM PROVIDES SPACE HEATING AND DOMESTIC HOT WATER TO A SINGLE FAMILY DWELLING UNIT OF APPROXIMATELY 1500 SQ. FT. THE 357 SQ. FT COLLECTOR UNIT CONSISTS OF 17 SUNWORKS FLAT PLATE WATER PANELS, MOUNTED DUE SOUTH AT A 90 DEGREE TILT. TO INCREASE THE INCIDENT RADIATION, THE ROOF BELOW THE COLLECTORS IS OFFSET 10 DEGREES FROM THE HORIZONTAL AND ACTS AS A REFLECTOR SURFACE. THE STORAGE SUBSYSTEM CONSISTS OF TWO 1250 GALLON TANKS, ONE OF WHICH IS NORMALLY SWITCHED OUT (I.E. BYPASSED) OF THE SOLAR SYSTEM OPERATION DURING THE SUMMER MONTHS. SUMMER IS DEFINED AS JUNE 1 THROUGH SEPT 30.

GENERAL SITE DATA:

INCIDENT SOLAR ENERGY	18.314	MILLION BTU
	17084	BTU/SQ.FT.
COLLECTED SOLAR ENERGY	2.028	MILLION BTU
	1892	BTU/SQ.FT.
AVERAGE AMBIENT TEMPERATURE	50	DEGREES F
AVERAGE BUILDING TEMPERATURE	57	DEGREES F
ECSS SOLAR CONVERSION EFFICIENCY	0.02	
ECSS OPERATING ENERGY	0.161	MILLION BTU
TOTAL SYSTEM OPERATING ENERGY	0.240	MILLION BTU
TOTAL ENERGY CONSUMED	2.770	MILLION BTU

SUBSYSTEM SUMMARY:

	HOT WATER	HEATING	COOLING	SYSTEM TOTAL
LOAD	0.000	0.604	N.A.	0.604 MILLION BTU
SOLAR FRACTION	0	72	N.A.	72 PERCENT
SOLAR ENERGY USED	0.000	0.432	N.A.	0.432 MILLION BTU
OPERATING ENERGY	N.A.	0.080	N.A.	0.240 MILLION BTU
AUX. THERMAL ENERGY	0.313	0.172	N.A.	0.484 MILLION BTU
AUX. ELECTRIC FUEL	0.313	0.189	N.A.	0.501 MILLION BTU
AUX. FOSSIL FUEL	N.A.	N.A.	N.A.	N.A. MILLION BTU
ELECTRICAL SAVINGS	0.000	0.059	N.A.	-0.101 MILLION BTU
FOSSIL SAVINGS	N.A.	N.A.	N.A.	N.A. MILLION BTU

SYSTEM PERFORMANCE FACTOR: 0.244

* DENOTES UNAVAILABLE DATA
@ DENOTES NULL DATA
N.A. DENOTES NOT APPLICABLE DATA

REFERENCE: USER'S GUIDE TO THE MONTHLY PERFORMANCE REPORT
OF THE NATIONAL SOLAR DATA PROGRAM,FEBRUARY 28,1978,
SOLAR/0004-78/18

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
SITE SUMMARY

SITE: LANDURA CORPORATION , STAYTON , OREGON SOLAR/1024-79/04
REPORT PERIOD: APRIL,1979

SITE/SYSTEM DESCRIPTION:
THE LANDURA CORPORATION SOLAR ENERGY SYSTEM PROVIDES SPACE HEATING AND DOMESTIC HOT WATER TO A SINGLE FAMILY DWELLING UNIT OF APPROXIMATELY 1500 SQ. FT. THE 357 SQ. FT COLLECTOR UNIT CONSISTS OF 17 SUNWORKS FLAT PLATE WATER PANELS, MOUNTED DUE SOUTH AT A 90 DEGREE TILT. TO INCREASE THE INCIDENT RADIATION, THE ROOF BELOW THE COLLECTORS IS OFFSET 10 DEGREES FROM THE HORIZONTAL AND ACTS AS A REFLECTOR SURFACE. THE STORAGE SUBSYSTEM CONSISTS OF TWO 1250 GALLON TANKS, ONE OF WHICH IS NORMALLY SWITCHED OUT (I.E. BYPASSED) OF THE SOLAR SYSTEM OPERATION DURING THE SUMMER MONTHS. SUMMER IS DEFINED AS JUNE 1 THROUGH SEPT 30.

GENERAL SITE DATA:

INCIDENT SOLAR ENERGY	19.321	GIGA JOULES
	194004	KJ/SQ.M.
COLLECTED SOLAR ENERGY	2.139	GIGA JOULES
	21481	KJ/SQ.M.
AVERAGE AMBIENT TEMPERATURE	10	DEGREES C
AVERAGE BUILDING TEMPERATURE	14	DEGREES C
DOSS SOLAR CONVERSION EFFICIENCY	0.02	
DOSS OPERATING ENERGY	0.169	GIGA JOULES
TOTAL SYSTEM OPERATING ENERGY	0.254	GIGA JOULES
TOTAL ENERGY CONSUMED	2.922	GIGA JOULES

SUBSYSTEM SUMMARY:

	HOT WATER	HEATING	COOLING	SYSTEM TOTAL
LOAD	0.000	0.637	N.A.	0.637 GIGA JOULES
SOLAR FRACTION	0	72	N.A.	72 PERCENT
SOLAR ENERGY USED	0.000	0.455	N.A.	0.455 GIGA JOULES
OPERATING ENERGY	N.A.	0.084	N.A.	0.254 GIGA JOULES
AUX. THERMAL ENG	0.330	0.181	N.A.	0.511 GIGA JOULES
AUX. ELECTRIC FUEL	0.330	0.199	N.A.	0.529 GIGA JOULES
AUX. FOSSIL FUEL	N.A.	N.A.	N.A.	N.A. GIGA JOULES
ELECTRICAL SAVINGS	0.000	0.063	N.A.	-0.107 GIGA JOULES
FOSSIL SAVINGS	N.A.	N.A.	N.A.	N.A. GIGA JOULES

SYSTEM PERFORMANCE FACTOR: 0.244

* DENOTES UNAVAILABLE DATA
@ DENOTES NULL DATA
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REFERENCE: USER'S GUIDE TO THE MONTHLY PERFORMANCE REPORT OF THE NATIONAL SOLAR DATA PROGRAM,FEBRUARY 28,1978, SOLAR/0004-78/18

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
ENERGY COLLECTION AND STORAGE SUBSYSTEM (ECSS)

SITE: LANDURA CORPORATION , STAYTON , OREGON SOLAR/1024-79/04
REPORT PERIOD: APRIL,1979

DAY OF MONTH	INCIDENT SOLAR ENERGY MILLION BTU	AMBIENT TEMP DEG-F	ENERGY TO LOADS MILLION BTU	AUX THERMAL TO ECSS MILLION BTU	ECSS OPERATING ENERGY MILLION BTU	ECSS ENERGY REJECTED MILLION BTU	ECSS SOLAR CONVERSION EFFICIENCY
1	0.212	43	0.000	N	0.036	N	0.000
2	0.455	45	0.000	C	0.035	C	0.000
3	0.369	46	0.000	T	0.024	T	0.000
4	1.294	51	0.001		0.009		0.000
5	1.422	54	0.002	A	0.009	A	0.001
6	0.103	49	0.003	P	0.000	P	0.010
7	1.235	51	0.037	P	0.006	P	0.014
8	0.093	47	0.035	L	0.000	L	0.169
9	0.564	43	0.085	I	0.000	I	0.072
10	0.113	42	0.113	C	0.000	C	0.497
11	0.495	46	0.078	A	0.000	A	0.076
12	0.162	47	0.074	E	0.000	B	0.237
13	0.544	46	0.062	L	0.000	L	0.059
14	0.364	46	0.058	E	0.000	E	0.085
15	0.375	49	0.066		0.000		0.093
16	0.321	47	0.051		0.000		0.087
17	0.571	41	0.051		0.000		0.051
18	0.760	42	0.031		0.000		0.023
19	0.618	47	0.000		0.000		0.000
20	1.250	50	0.000		0.009		0.000
21	0.752	54	0.011		0.004		0.007
22	0.218	51	0.013		0.000		0.027
23	0.300	50	0.045		0.000		0.074
24	0.709	53	0.020		0.006		0.014
25	1.193	56	0.015		0.007		0.006
26	1.111	60	0.000		0.007		0.000
27	0.158	56	0.000		0.000		0.000
28	0.740	58	0.000		0.002		0.000
29	1.135	58	0.000		0.005		0.000
30	0.477	55	0.000		0.001		0.000
SUM	18.314	-	0.852	N.A.	0.161	N.A.	-
AVG	0.610	50	0.028	N.A.	0.005	N.A.	0.024
NBS ID	Q001	N113			Q102		N111

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
COLLECTOR ARRAY PERFORMANCE

SITE: LANDLRA CORPORATION , STAYTON , OREGON SOLAR/1024-79/04
REPORT PERIOD: APRIL,1979

DAY OF MONTH	INCIDENT SOLAR ENERGY MILLION BTU	OPERATIONAL INCIDENT ENERGY MILLION BTU	COLLECTED SOLAR ENERGY MILLION BTU	DAYTIME AMBIENT TEMP DEG F	COLLECTOR ARRAY EFFICIENCY
1	0.212	0.212	-0.028	47	-0.131
2	0.455	0.455	0.029	48	0.063
3	0.369	0.369	0.040	52	0.108
4	1.294	1.062	0.238	60	0.184
5	1.422	1.059	0.252	63	0.178
6	0.103	0.000	0.000	49	0.000
7	1.236	0.671	0.166	60	0.135
8	0.093	0.000	0.000	49	0.000
9	0.564	0.000	0.000	45	0.000
10	0.113	0.000	0.000	43	0.000
11	0.495	0.000	0.000	49	0.000
12	0.162	0.000	0.000	*	0.000
13	0.544	0.000	0.000	51	0.000
14	0.364	0.000	0.000	53	0.000
15	0.375	0.008	0.004	52	0.011
16	0.321	0.000	0.000	49	0.000
17	0.571	0.000	0.000	44	0.000
18	0.760	0.000	0.000	48	0.000
19	0.818	0.000	0.000	55	0.000
20	1.250	0.906	0.272	59	0.218
21	0.752	0.460	0.144	61	0.192
22	0.218	0.000	0.000	52	0.000
23	0.300	0.010	0.004	51	0.014
24	0.709	0.426	0.143	59	0.201
25	1.193	0.816	0.255	63	0.214
26	1.111	0.739	0.254	72	0.229
27	0.158	0.000	0.000	56	0.000
28	0.740	0.134	0.074	64	0.099
29	1.135	0.531	0.170	66	0.150
30	0.477	0.017	0.010	64	0.021
SUM	18.314	7.876	2.028	-	-
AVG	0.610	0.263	0.068	55	0.111
NBSID	G001		G100		N100

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
STORAGE PERFORMANCE

SITE: LANDURA CORPORATION , STAYTON , OREGON SOLAR/1024-79/04
REPORT PERIOD: APRIL,1979

DAY OF MONTH	ENERGY TO STORAGE MILLION BTU	ENERGY FROM STORAGE MILLION BTU	CHANGE IN STORED ENERGY MILLION BTU	STORAGE AVERAGE TEMP DEG F	STORAGE EFFICIENCY
1	-0.049	0.000	-0.043	65	0.879
2	0.005	0.000	0.009	64	1.797
3	0.023	0.000	0.031	65	1.384
4	0.213	0.001	0.243	72	1.142
5	0.196	0.001	0.210	83	1.081
6	0.000	0.002	-0.044	88	1.000
7	0.115	0.018	0.113	88	1.140
8	0.000	0.019	-0.060	90	1.000
9	0.000	0.045	-0.077	86	1.000
10	0.000	0.057	-0.090	82	1.000
11	0.000	0.040	-0.061	78	1.000
12	0.000	0.036	-0.056	76	1.000
13	0.000	0.030	-0.048	73	1.000
14	0.000	0.027	-0.041	71	1.000
15	0.002	0.031	-0.029	69	0.711
16	0.000	0.023	-0.030	68	1.000
17	0.000	0.022	-0.034	67	1.000
18	0.000	0.013	-0.023	65	1.000
19	0.000	0.000	-0.005	64	1.000
20	0.182	0.000	0.207	69	1.134
21	0.095	0.005	0.086	76	0.968
22	0.000	0.007	-0.027	78	1.000
23	0.003	0.023	-0.031	76	-3.066
24	0.077	0.010	0.071	77	1.058
25	0.146	0.007	0.154	83	1.104
26	0.133	0.000	0.125	89	0.945
27	0.000	0.000	-0.040	92	1.000
28	0.048	0.000	0.008	91	0.173
29	0.097	0.000	0.083	93	0.865
30	0.006	0.000	-0.026	95	-4.240
SUM	1.291	0.419	0.574	-	-
AVG	0.043	0.014	0.019	78	0.769
NBS ID	G200	G201	G202		N108

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
HOT WATER SUBSYSTEM

SITE: LANDURA CORPORATION , STAYTON , OREGON — SOLAR/1024-79/04
REPORT PERIOD: APRIL,1979

DAY OF MON.	HOT WATER LOAD MILLION BTU	SOLAR FR.OF LOAD PER CENT	SOLAR ENERGY USED MILLION BTU	OPER ENERGY MILLION BTU	AUX THERMAL USED MILLION BTU	AUX ELECT FUEL MILLION BTU	AUX FOSSIL FUEL MILLION BTU	ELECT ENERGY SAVINGS MILLION BTU	FOSSIL ENERGY SAVINGS MILLION BTU	SUP. WAT. TEMP DEG F	HOT WAT. TEMP DEG F	HOT WATER USED GAL
1	0.000	0	0.000	N	0.012	0.012	N	0.000	N	60	140	0
2	0.000	0	0.000	O	0.009	0.009	O	0.000	O	60	140	0
3	0.000	0	0.000	T	0.010	0.010	T	0.000	T	60	140	0
4	0.000	0	0.000		0.009	0.009		0.000		60	140	0
5	0.000	0	0.000	A	0.010	0.010	A	0.000	A	60	140	0
6	0.000	0	0.000	P	0.010	0.010	P	0.000	P	60	140	0
7	0.000	0	0.000	P	0.011	0.011	P	0.000	P	60	140	0
8	0.000	0	0.000	L	0.010	0.010	L	0.000	L	60	140	0
9	0.000	0	0.000	I	0.012	0.012	I	0.000	I	60	140	0
10	0.000	0	0.000	C	0.010	0.010	C	0.000	C	60	140	0
11	0.000	0	0.000	A	0.010	0.010	A	0.000	A	60	140	0
12	0.000	0	0.000	B	0.011	0.011	B	0.000	B	60	140	0
13	0.000	0	0.000	L	0.011	0.011	L	0.000	L	60	140	0
14	0.000	0	0.000	E	0.010	0.010	E	0.000	E	60	140	0
15	0.000	0	0.000		0.011	0.011		0.000		60	140	0
16	0.000	0	0.000		0.010	0.010		0.000		60	140	0
17	0.000	0	0.000		0.010	0.010		0.000		60	140	0
18	0.000	0	0.000		0.012	0.012		0.000		60	140	0
19	0.000	0	0.000		0.011	0.011		0.000		60	140	0
20	0.000	0	0.000		0.011	0.011		0.000		60	140	0
21	0.000	0	0.000		0.010	0.010		0.000		60	140	0
22	0.000	0	0.000		0.010	0.010		0.000		60	140	0
23	0.000	0	0.000		0.010	0.010		0.000		60	140	0
24	0.000	0	0.000		0.012	0.012		0.000		60	140	0
25	0.000	0	0.000		0.011	0.011		0.000		60	140	0
26	0.000	0	0.000		0.010	0.010		0.000		60	140	0
27	0.000	0	0.000		0.009	0.009		0.000		60	140	0
28	0.000	0	0.000		0.010	0.010		0.000		60	140	0
29	0.000	0	0.000		0.010	0.010		0.000		60	140	0
30	0.000	0	0.000		0.011	0.011		0.000		60	140	0
SUM	0.000	-	0.000	N.A.	0.313	0.313	N.A.	0.000	N.A.	-	-	0
AVG	0.000	0	0.000	N.A.	0.010	0.010	N.A.	0.000	N.A.	60	140	0
NBS	Q302	N300	Q300	Q303	Q301	Q305	Q306	Q311	Q313	N305	N307	N308

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
SPACE HEATING SUBSYSTEM

SITE: LANDURA CORPORATION , STAYTON , OREGON SOLAR/1024-79/04
REPORT PERIOD: APRIL,1979

DAY OF MON.	SPACE HEATING LOAD MILLION BTU	SOLAR FR.OF LOAD PCT	SOLAR ENERGY USED MILLION BTU	OPER ENERGY MILLION BTU	AUX THERMAL USED MILLION BTL	AUX ELECT FUEL MILLION BTL	AUX FOSSIL FUEL MILLION BTL	ELECT ENERGY SAVINGS MILLION BTU	FOSSIL ENERGY SAVINGS MILLION BTU	BLDG TEMP DEG. F	AMB TEMP DEG. F
1	0.009	0	0.000	0.001	0.009	0.009	N	-0.005	N	52	43
2	0.008	0	0.000	0.001	0.008	0.008	O	-0.005	O	53	45
3	0.008	0	0.000	0.001	0.008	0.008	T	-0.005	T	53	46
4	0.000	118	0.001	0.000	-0.000	0.000		0.000		55	51
5	0.001	111	0.001	0.000	-0.000	0.000	A	0.000	A	57	54
6	0.001	129	0.001	0.000	-0.000	0.000	P	0.000	P	58	49
7	0.017	103	0.017	0.002	-0.000	0.000	P	0.007	P	58	51
8	0.015	103	0.016	0.002	-0.000	0.000	L	0.006	L	58	47
9	0.039	104	0.041	0.004	-0.002	0.000	I	0.016	I	57	43
10	0.053	106	0.056	0.006	-0.003	0.000	C	0.022	C	56	42
11	0.035	108	0.038	0.005	-0.003	0.000	A	0.013	A	56	46
12	0.037	105	0.038	0.005	-0.002	0.000	E	0.014	E	56	47
13	0.030	105	0.032	0.005	-0.001	0.000	L	0.012	L	56	46
14	0.030	102	0.031	0.006	-0.001	0.000	E	0.012	E	56	46
15	0.034	104	0.035	0.005	-0.001	0.000		0.013		56	49
16	0.027	102	0.028	0.006	-0.001	0.000		0.010		56	47
17	0.029	101	0.029	0.006	-0.000	0.000		0.012		56	41
18	0.073	24	0.018	0.009	0.055	0.055		-0.024		56	42
19	0.056	0	0.000	0.004	0.056	0.056		-0.029		58	47
20	0.052	0	0.000	0.003	0.052	0.052		-0.028		59	50
21	0.005	103	0.005	0.002	-0.000	0.000		0.002		58	54
22	0.006	103	0.006	0.001	-0.000	0.000		0.002		58	51
23	0.022	103	0.022	0.003	-0.001	0.000		0.008		57	50
24	0.009	106	0.010	0.001	-0.001	0.000		0.003		58	53
25	0.008	101	0.008	0.001	-0.000	0.000		0.003		59	56
26	0.000	0	0.000	0.000	0.000	0.000		0.000		61	60
27	0.000	0	0.000	0.000	0.000	0.000		0.000		62	56
28	0.000	0	0.000	0.000	0.000	0.000		0.000		62	58
29	0.000	0	0.000	0.000	0.000	0.000		0.000		63	58
30	0.000	0	0.000	0.000	0.000	0.000		0.000		63	55
SUM	0.604	-	0.432	0.080	0.172	0.189	N.A.	0.059	N.A.	-	-
AVG	0.020	72	0.014	0.003	0.006	0.006	N.A.	0.002	N.A.	57	50
NBS	Q402	N400	Q400	Q403	Q401		Q410	Q415	Q417	N406	N113

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
ENVIRONMENTAL SUMMARY

SITE: LANDURA CORPORATION . STAYTON . OREGON
REPORT PERIOD: APRIL,1979

SOLAR/1024-79/04

DAY OF MONTH	TOTAL INSOLATION BTU/SQ.FT	DIFFUSE INSOLATION BTU/SQ.FT	AMBIENT TEMPERATURE DEG F	DAYTIME AMBIENT TEMP DEG F	RELATIVE HUMIDITY PERCENT	WIND DIRECTION DEGREES	WIND SPEED M.P.H.
1	198	N	43	47	N	N	N
2	424	O	45	48	O	O	O
3	345	T	46	52	T	T	T
4	1207		51	60			
5	1326	A	54	63	A	A	A
6	96	P	49	49	P	P	P
7	1152	P	51	60	P	P	P
8	87	L	47	49	L	L	L
9	526	I	43	45	I	I	I
10	106	C	42	43	C	C	C
11	462	A	46	49	A	A	A
12	151	B	47	*	B	B	B
13	507	L	46	51	L	L	L
14	340	E	46	53	E	E	E
15	350		49	52			
16	300		47	49			
17	532		41	44			
18	709		42	48			
19	763		47	55			
20	1166		50	59			
21	701		54	61			
22	203		51	52			
23	280		50	51			
24	661		53	59			
25	1113		56	63			
26	1037		60	72			
27	148		56	56			
28	691		58	64			
29	1059		58	66			
30	445		55	64			
SUM	17084	N.A.	-	-	-	-	-
AVG	569	N.A.	50	55	N.A.	N.A.	N.A.
NBS ID	G001		N113			N115	N114

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SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
THERMODYNAMIC CONVERSION EQUIPMENT

SITE: LANDURA CORPORATION , STAYTON , OREGON SOLAR/1024-79/04
REPORT PERIOD: APRIL,1979

DAY OF MONTH	EQUIPMENT LOAD MILLION BTU	THERMAL ENERGY INPUT MILLION BTU	OPERATING ENERGY MILLION BTU	ENERGY REJECTED MILLION BTU	COEFFICIENT OF PERFORMANCE (SEE NOTE)
1	0.000	0.000	N	N	0.000
2	0.000	0.000	O	O	0.000
3	0.000	0.000	T	T	0.000
4	-0.000	0.000			0.000
5	-0.000	0.000	A	A	0.000
6	-0.000	0.000	P	P	0.000
7	-0.000	0.000	P	P	0.000
8	-0.000	0.000	L	L	0.000
9	-0.002	0.000	I	I	0.000
10	-0.003	0.000	C	C	0.000
11	-0.003	0.000	A	A	0.000
12	-0.002	0.000	E	E	0.000
13	-0.001	0.000	L	L	0.000
14	-0.001	0.000	E	E	0.000
15	-0.001	0.000			0.000
16	-0.001	0.000			0.000
17	-0.000	0.000			0.000
18	-0.000	0.000			0.000
19	-0.000	0.000			0.000
20	0.000	0.000			0.000
21	-0.000	0.000			0.000
22	-0.000	0.000			0.000
23	-0.001	0.000			0.000
24	-0.001	0.000			0.000
25	-0.000	0.000			0.000
26	0.000	0.000			0.000
27	0.000	0.000			0.000
28	0.000	0.000			0.000
29	0.000	0.000			0.000
30	0.000	0.000			0.000
SUM	-0.017	0.000	*	*	0.000
AVG	-0.001	0.000	*	*	0.000

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N.A. DENOTES NOT APPLICABLE DATA.